IDAHO DEPARTMENT OF FISH AND GAME

ANNUAL REPORT

MACKAY HATCHERY

1992

Prepared By:

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INTRODUCTION

The Mackay Hatchery is a specialty fish production station located approximately 12 miles north of the town of Mackay in Custer County, Idaho. The hatchery produces salmonids of various species and strains, from 1 to 14 inches in length, for statewide distribution. Funding for operational costs is obtained under contract from Wallop-Breaux funds. A schematic of the hatchery design is included in Figure 1.

FISH PRODUCTION

Production for 1992 was 3,661,936 fish weighing 115,671 pounds (Table 1). Cost of fish produced averaged $1.715 per pound and $0.052 per fish (Table 2). Included in the year's production were 19 lots, comprised of 8 species and 12 different strains, as follows:

- Rainbow trout
  - Arlee (Mt) (3 year classes)
  - Mt. Shasta (Ca)
  - Pennask River (BC)
- Cutthroat trout
  - Westslope (2 year classes)
  - Henrys Lake
- Brown trout
  - Saratoga (Wy) (2 year classes)
  - Spring Creek (Mt)
- Rainbow x Cutthroat trout hybrids (2 year classes)
- Coho salmon
- Early kokanee salmon (2 year classes)
- Fall Chinook salmon (2 year classes)
- Grayling

HATCHERY IMPROVEMENTS

An 8-inch valve was installed on the cleaning drain for the large raceways to keep water out of the cleaning ditch at all times, except while actually cleaning raceways.

Three new 16-tray Heath incubator stacks were added to the battery of incubators to replace some of the many worn-out stacks. Twenty additional automatic fry feeders were purchased, and aluminum-framed, perforated-plate raceway screens were built.

The metal roof on residence 11 was replaced, and the exterior of residence 03 was washed, scraped, primed, painted, and trimmed by the hatchery crew. The trim on the shop building and the 3-stall garage was painted by the hatchery crew. Eighty yards of shale was purchased and spread on the hatchery roadways by the hatchery crew. The large bay doors on the garage and the tracks they slide on were rebuilt by the hatchery crew. The roofs on the garage and the shop were re-nailed.

A new baffle was constructed for the 400-gallon fish transport tank, and an additional aerator mount was built for more efficient fish transportation. A fold-up access step and a sliding access step were constructed for the 2-ton fish truck to make access to the deck easier and safer for the operator. A fire

hose storage cabinet was built for the 2-ton fish truck as part of the hatchery's fire-suppression program. Large raceway walls were patched as part of the overall maintenance program.

FUTURE NEEDS

The furnace and wood stove in residence #3 are near the end of their useful life. The siding on residence #1 is now 43 years old. It is cracking and warping and needs to be replaced. Additional fry feeders and replacement incubators are needed for the hatchery building. The valve installed in the large raceway cleaning system needs to be buried to keep it from freezing. The roof on the shop peels up continually. The metal sheeting, and the underlying plywood, needs to be replaced.

FISH HEALTH

Generally, fish health was good this year. Westslope cutthroat (Lot 2-U-Id-16) suffered some Bacterial Gill Disease after their transfer from the McCall Hatchery. This is a recurring problem, and is probably caused by a change in water quality from McCall to Mackay. In the future, this problem will be anticipated, and prophylactic treatments will be started when fish are received from McCall.

Under direction of the resident pathologist, all lots were fed a manufacturer's Terramycin-medicated diet for 14 days, when they were 2000/lb, as a prophylaxis against Coldwater Disease. Coldwater Disease was not found in any lot this year.

Bacterial Kidney Disease was detected in Arlee rainbow this year, using the ELISA technique (Table 3), but no mortality was observed. Bacterial infections were found in Henrys Lake cutthroat and in Spring Creek brown trout.

A summary of disease inspections is included in Table 3.

FISH STOCKED AND TRANSFERRED

Fingerling of various species and strains were stocked in all seven regions of Idaho (Table 1). Brown trout fry were raised to 2 inches in length and then transferred to the Hagerman Hatchery.

Catchable rainbow trout (8 inches +) were stocked in Regions 6 and 7 and transferred to the Ashton Hatchery for redistribution when drought affected waters in the Mackay stocking area.

Early kokanee, received as green eggs from the Deadwood Reservoir trap, performed poorly this year and achieved only a 50% survival to swim-up. This was perhaps caused by warm temperatures at Deadwood Reservoir during egg formation.

FISH SPAWNING

The run of October kokanee in Paulina Lake, Oregon was much later, and numbers were down significantly from past years. No eggs were available from that source this year.

FISH FEED

There were 122,985 pounds of fish feed used during the year, at a cost of $39,218.81. Feed conversion averaged 1.063 pounds of feed per pound of fish produced. Feed cost per pound of fish produced was $0.3394.

Biodiet, Biodry 1000, Biodry Trout, Rangen Trout & Salmon diet, Rangen Soft-moist diet, and Nelson's Sterling Silver Cup Salmon diet brands were used, depending on the nutritional needs of different strains.

FISH FEED TRIAL

A feed study was conducted between February and May 1992 to compare the performance of two commercially available fish feed diets. Areas of interest included cost per pound of fish gained, feed conversion, condition factor, mortality, and cleaning time.

Materials and Methods

Early-spawning kokanee fry were used for the experiment and were readily feeding when it began. Identical numbers of fish were loaded into six outside raceways representing three replicate trials. Raceway set 3 & 4 each contained 67,302 fish at 474 fish per pound, totalling 142 pounds. This trial ran for 105 days. Raceway set 5 & 6 each contained 99,865 fish at 450 per pound, totalling 219.7 pounds. This trial ran for 102 days. Raceway set 7 & 8 each contained 99,546 fish at 400 fish per pound, totalling 248.8 pounds. This trial ran for 69 days. The flow index, density index, and water temperature were the same for each set of raceways. The raceways were cleaned, and the mortalities were removed and recorded daily.

Rangen Trout and Salmon Starter #2 and Silver Cup Salmon Fry #2 feeds were used in the experiment. The cost per pound was $0.44 and $0.3840, respectively. Raceways 3, 5, and 7 were fed the Rangen diet, while raceways 4, 6, and 8 were fed the Silver Cup diet. Using the Haskell formula, a projected conversion of 1.15, a daily length increase of 0.016 inch, and a hatchery constant of 5.52 was used. A percentage of body weight was then calculated to determine the amount of feed per day. A feeding schedule was calculated for the entire study at the outset, with adjustments made every three days. The feed was weighed daily, and 12-hour belt feeders were used for distribution.

Sample counts were taken only at the beginning and at termination of the trial to eliminate the potential for biases arising from multiple sample counts. A sample of 200 fish from each raceway was taken at the end of the trial. Length frequencies to the nearest millimeter were taken and the condition factor, as well as the final sample count were calculated using these fish.

Results

The three trials were combined to simplify the results, as the trends in the individual trials are reflected in the overall results. In overall performance, the Rangen diet exceeded the Silver Cup diet. The Rangen Diet had greater total weight gain, less cost per pound fish gained, greater growth in length per day, better feed conversion, slightly better condition factor, less

mortality, greater ending length, and less cleaning time. Although the Rangen feed cost more per pound, it cost less per pound of fish gained, therefore making it more economical. Higher mortality was evident in all three raceways using the Silver Cup diet. The cleaning time was 50% longer with the Silver Cup, which made it costly over the extent of the production cycle.

End Results

DIET	RANGEN	SILVER CUP
FEED (LB)	2,385	2,372
COST ($)	1,049	910.85
WEIGHT GAIN (LB)	2,992.5	2,523.2
COST/LB GAIN ($)	.351	.361
GROWTH/DAY (INCHES)	.018	.016
FEED CONVERSION	.797	.940
CONDITION FACTOR C	2996	2933
MORTALITY	1432	1578
END LENGTH	3.60"	3.46"
CLEANING TIME/DAY	10 MINUTES	15 MINUTES

STERILE HYBRID PROGRAM

In the spring of 1989, the Henrys Lake Hatchery crossed approximately 160,000 Henrys Lake cutthroat eggs with Lake McConaughy rainbow sperm from the Ennis National Fish Hatchery for this project. During incubation, the eggs were immersed in a 0.40 mg/1 solution of 17-alpha-methyl testosterone for two hours at 63% and at 78% of hatch, as measured by temperature units. After eyeing, 134,000 of these eggs were shipped to the Mackay Hatchery. At the Mackay Hatchery, the resultant fry were given an identical treatment with the steroid at 102% and 116% of hatch. As the fish began to feed, Rangen soft-moist feed was top-dressed with the methyl testosterone in a fish oil carrier to provide 10 mg/kg of feed and fed for 90 days at a hatchery constant of 6. Most of these fish were planted in Henrys Lake in the late summer of 1989.

There were 350 of the treated fish held at the Mackay Hatchery for gross and histological inspection of the gonads during the next three years and for an assessment of the efficiency of the sterilizing procedure. Fish were sampled randomly for inspection on March 8, 1990; April 16, 1991; February 12, 1992; and May 7, 1992. Results are tabulated below.

SAMPLE DATE	NUMBER EXAMINED	OBVIOUS MALES	OBVIOUS FEMALES	NO GONADAL DEVELOPMENT
3/8/90	20	17	0	3
4/16/91	30	16	0	14
2/12/92	0	(All samples lost before		
5/7/92	16	5	0	11

At the conclusion of the study, all remaining individuals were stocked in Mackay Reservoir.

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There are at least two possibilities relating to the results of the sterilization experiment. Gonadal development of females may have been arrested by the steroid, or XX males may have been induced.

PUBLIC RELATIONS

Approximately 800 people toured the hatchery during the year. Due to the remote location and unfavorable climate of the hatchery, few people actually seek it out. Most are hunters and fishermen who happen here incidental to other activities.

Hatchery tours were given to two school groups. A fish identification class was given to a Mackay High School class. The hatchery crew and the local Conservation Officer joined Idaho's "Adopt-A-Highway" litter control program. **Five** miles of Highway 93 along Mackay Reservoir are cleaned twice yearly.

CATCHABLE RAINBOW FIN CONDITION

Using the "Ashton Method" for measuring fin condition of catchable rainbow, measurements were taken several times during the planting season. Fins measured were 61% of wild fish for Arlee rainbow catchables and 54% of wild fish for Mt. Shasta rainbow catchables.

FISH MARKING

Catchable rainbow stocked in Mackay Reservoir were adipose fin-clipped to test the relative contribution of catchables and fall-stocked fingerling. Early kokanee stocked in Payette Lake were adipose fin-clipped. Ten percent (100,000) of the Henrys Lake cutthroat stocked in Henrys lake were adipose fin-clipped. Fall chinook stocked in Coeur d'Alene lake were right ventral fin-clipped.

CREEL CENSUS

During the summer of 1992, a creel census was conducted at Mackay Reservoir by Region 6 Fisheries Management, Region 7 Enforcement, and the Mackay Hatchery crew. The purpose of the census was to assess the contribution of summer-stocked catchables and fall-stocked fingerling in the reservoir. The study showed that fingerling stocked in the fall contribute little to the catch, although it must be remembered that the area has been in a 6-year drought. The full text of the study will be in the Region 6 report, but is not ready at the time of this printing.

ACKNOWLEDGMENTS

During 1991, the Mackay Hatchery crew included Bill Doerr, Fish Hatchery Superintendent II; Doug Engemann, Fish Hatchery Superintendent I; Robert Hoover, Fish Culturist; Linda Williams, Biological Aide; and at different times, Glenn McConnell and Jason Rheinhardt, Biological Aides. Manpower available and expended totaled 36 permanent, and 16 temporary man-months.

Table 1. Fish production at Mackay Fish Hatchery, January 1 to December 31, 1992.

Species and strain	Lot number	Source	Received as	Number/Pound received or carried over (*)	Yield (number/ pound)	Destination, Comments
Rainbow RA Arlee	1-En-RA	Ennis NFH, MT	Eyed Eggs	74,422/ 18,545*	76,564/ 40,184	Regions 6 & 7, Catchables
Rainbow RA Arlee	2-En-RA	Ennis NFH, MT	Eyed Eggs	200,000/ 200*	196,215/ 38,545	Regions 6 & 7, Fingerling & Catchables
Rainbow RA Arlee	3-En-RA	Ennis NFH, MT	Eyed Eggs	165,998/ eggs	138,000/ 38	1994 Catchables
Rainbow R5 Mt. Shasta	1-En-R5	Ennis NFH, MT	Eyed Eggs	38,771/ 5,885*	37,976/ 15,480	Regions 6 & 7, Catchables
Rainbow RP Pennask R.	1-F-Can	Summerland Trout Hatchery, B.C.	Eyed Eggs	12,290/ 50*	10,000/ 500	Little Payette Lake.
Cutthroat C2 Westslope	1-U-Id-16	McCall SFH, ID	Fry	24,000/ 490*	24,035/ 2,150	Payette Lake Net Pen
Cutthroat C2 Westslope	2-U-Id-16	McCall SFH, ID	Fry	76,000/ 171	46,250/ 386	Region 7 High Mountain Lakes, Payette Lake Net Pen 1993.
Cutthroat C3 Henrys Lake	2-U-Id-C3	Henrys Lake SFH, ID	Eyed Eggs	1,258,557/ eggs	962,080/ 11,928	Region 6 High Mountain Lakes, Henrys Lake, Sublett
Brown BNT Plymouth Rock	1-Sr	Saratoga NFH, WY	Eyed Eggs	200,000/ 80*	197,210/ 4,686	Regions 4 & 6 Fingerling
Brown BNT Plymouth Rock	2-Sr	Saratoga NFH, WY	Eyed Eggs	208,297/ eggs	170,000/ 64	Regions 4 & 6 Fingerling
Brown BNT Spring Cr.	2-Y-Mt	Spring Creek Hatchery, MT	Eyed Eggs	100,000/ 25*	112,400/ 3,735	Regions 4 & 6

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Table 1. Continued.

Species and strain	Lot number	Source	Received as	Number/Pound received or carried over (*)	Yield (number/ pound)	Destination, Comments
Rainbow x Cutthroat Hybrids RC	2-U-Id-RC	Henrys Lake SFH, ID	Eyed Eggs	505,000/ eggs	390,075/ 8,090	Regions 2, 3, 5, 6
Rainbow x Cutthroat Hybrids RC	9-RC-HOR	Henrys Lake SFH, ID	Eyed Eggs	160/ 320*	160/ 380	Held for assessment of gonadal development. Methyl-sterilized.
Coho Salmon CO	2-Wd	Willard/White Salmon NFH, WA	Eyed Eggs	31,000/ 22*	30,400/ 3,200	Lake Fork Creek, as smolts September 1992.
Kokanee KE Deadwood	1-U-Id-KE	Deadwood Res., ID	Green Eggs	800,000/ 240*	698,621/ 11,443	Regions 2, 3, 4, 5, 6, 7
Kokanee KE Deadwood	2-U-Id-KE	Deadwood Res., ID	Green Eggs	1,229,262 eggs	560,000/ 224	Regions 3, 4, 6.
Fall Chinook FC Wolflodge	1-U-Id-FC	Sandpoint SFH, ID	Eyed Eggs	13,000/ 13*	10,000/ 500	Coeur d'Alene Lake, RV fin clip 2% clip error, hand count.
Fall Chinook FC Wolflodge	2-U-Id-FC	Sandpoint SFH, ID	Eyed Eggs	14,220/ eggs	0/ 0	Destroyed as Swim-ups, Program Discontinued.
Grayling GR Wyoming	2-U-Id-Gr	Ashton, SFH, ID	Fry	1,783/ 0.53	1,950/ 8.0	Region 7 High Mountain Lakes

*Denotes numbers and pounds of fish carried over from previous year.

Table 2. Costs of fish stocked and transferred, Mackay Fish Hatchery, 1992.

Size, Species & Strain	Fish stocked numbers	Fish stocked pounds	Fish transferred numbers	Fish transferred pounds	Cost per pound	Cost per fish
11- to 14-inch Arlee rainbow trout	72,253	37,734	4,311	2,450	$1.67	$0.876
5- to 8-inch Arlee rainbow trout	86,415	8,870			1.68	.172
10- to 11-inch Mt. Shasta rainbow trout	25,611	10,530	12,375	4,950	1.67	.681
5-inch Pennask River rainbow trout	10,000	500			1.78	.089
2-inch Saratoga brown trout			93,300	311	1.73	.006
4- to 5-inch Saratoga brown trout	103,910	4,375			1.73	.073
4- to 5-inch Spring Cr. brown trout	112,400	3,735			1.73	.057
6-inch westslope cutthroat trout	24,037	2,150			1.73	.154
2-inch westslope cutthroat trout	26,500	53			97.84*	.196
3-inch Henrys Lake cutthroat trout	962,080	11,928			1.91	.023
3- to 4-inch rainbow x cutthroat hybrids	390,075	8,090			1.90	.039
18-inch rainbow x cutthroat hybrids	160	380			2.40	5,700
3.5-inch early kokanee salmon	636,621	7,243			1.70	.019
6.4-inch early kokanee salmon	63,000	4,200			1.72	.114
5.5-inch Wolflodge fall chinook salmon	10,000	500			1.93	.096
6.6-inch Columbia River coho smolts	30,400	3,200			1.81	.189
2.25-inch grayling	1,950	8			23.50*	.096

*Includes cost of helicopter rental for stocking in high mountain lakes.

Table 3. Fish health inspections at Mackay Fish Hatchery, January 1, 1992 - December 31, 1992.

Sample date	Species/Strain	Lot number	VH	VP	VE	BK	BF	BR	BC	PX	PW	PC	PI	Comments
2/12/92	Arlee Rainbow	1-En-Ra	-	-		+								Viro: 0/10, BK 0/10 (FAT) 1/2 pools +)ELISA, low)
2/12/92	Coho	2-WD									-			PW 0/10
2/12/92	RC HYBRIDS	2-U-ID-RC									-			PW 0/1 (dolphin head)
4/07/92	Pennask rainbow	1-F-Canada												
4/07/92	Early kokanee	1-U-Id-Ke	-	-										Viro 0/5
4/07/92	Arlee rainbow	1-En-Ra	-	-										Viro 0/5
4/07/92	Saratoga Brown	1-Sr	-	-										Viro 0/5
4/07/92	Spring Creek Brown	2-Y-Mt	-	-		-	-	-	+					BK (FAT) 0/8, viro 0/10, BC 2/4 A. hydrophila (very light), and F. psychrophilus (light)
4/15/92	Saratoga Brown	1-Sr												
7/02/92	Henrys Lake Ctt	2-U-Id-C3					-	-	-		-			bacty neg, PW 0/15, Flexibacter sp.
8/12/92	Columbia Coho	2-WD				-	-	-	-					BK (ELISA & FAT) 0/10, bacty 0/4
8/12/92	Arlee rainbow	2-En-Ra				-	-	-	-					BK (ELISA) 1/1+ (10 fish) low, bacty 0/4

VH = IHNV, infectious hematopoietic necrosis virus
VP = IPNV, infectious pancreatic necrosis virus
VE = EIBS, erythrocytic inclusion body syndrome virus
BK = bacterial kidney disease agent, Renibacterium salmoninarum
BR = enteric red mouth bacterium, Yersinia ruckeri
BC = bacterial cold water disease, Cytophaga psychrophila or Flexibacter psychrophilus
BF = bacterial furunculosis, Aeromonas salmonicida
PKX, agent of PKD, proliferative kidney disease
PC = Ceratomyxa shasta, agent of ceratomyxosis PI
= Infestation by Icthyophthirius multifilis

+ = Positive results
- = Negative results
* = Testing in progress

ELISA = enzyme-linked innumosorbent assay
FAT = fluorescent antibody test (direct) PW =

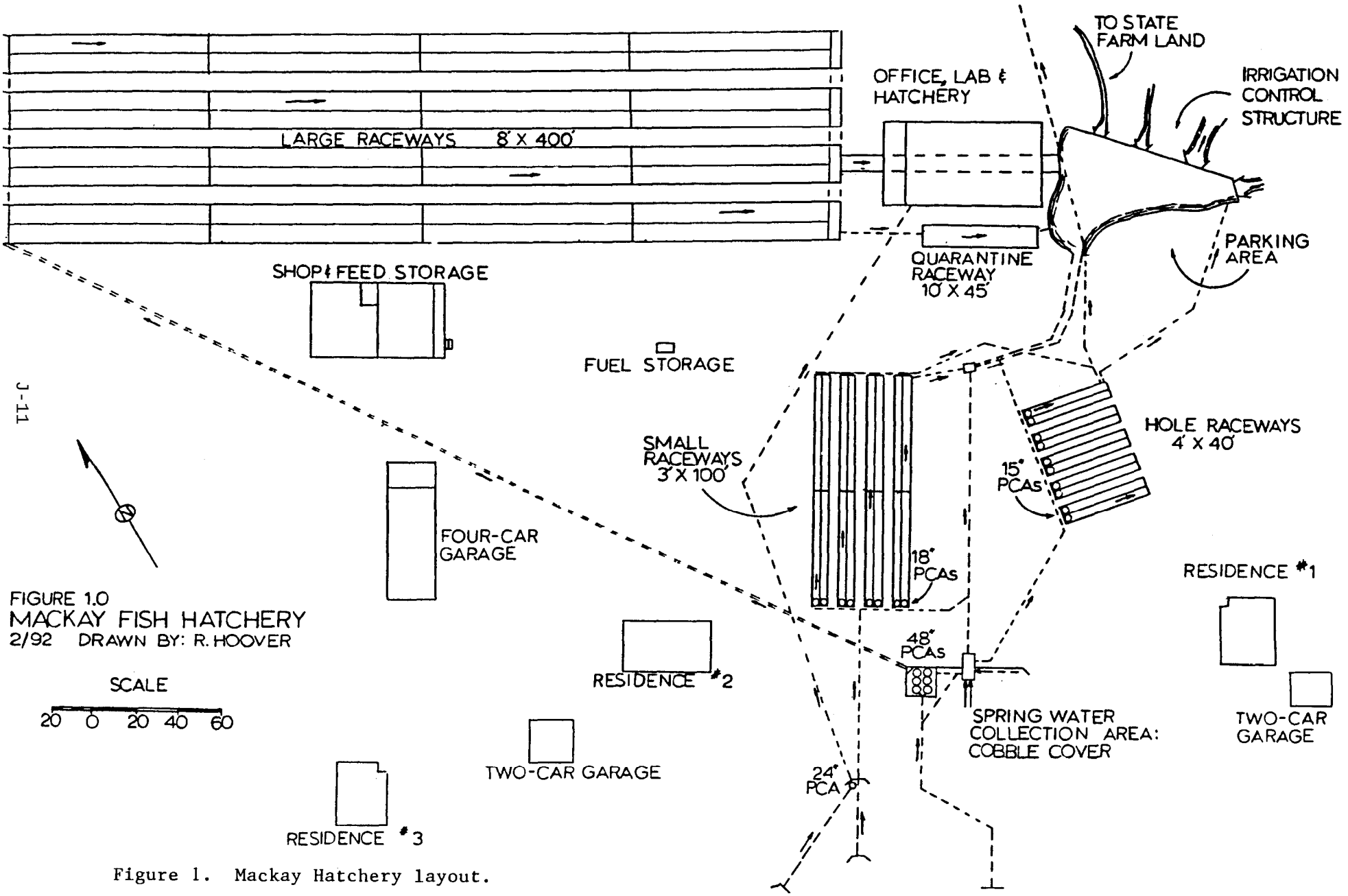

Figure 1. Mackay Hatchery layout.